GGBP Case Study Series

European Union Low-Carbon Roadmap

Related Chapter: Assessing and communicating benefits of green growth

Case developed by: Pete Harrison

Country: European Union

Sector(s): electricity, transport, buildings

Key words: plan, low-carbon economy, cost-effective pathway

The objective of the "Roadmap for moving to a competitive low carbon economy in 2050" of the European Union was to demonstrate that reducing EU greenhouse gas emissions by 80-95 percent by 2050 is feasible, and can be achieved without significant negative economic impacts. A range of possible decarbonization pathways for the EU were developed within the roadmap.

Context

Many European Union (EU) leaders over the past decade have sought to define the bloc as a global leader in tackling climate change. This was most visibly demonstrated in 2008, when a package of climate and energy objectives was agreed for 2020: primarily a target of reducing emissions by 20 percent compared with 1990 levels, to be achieved largely via a 20 percent mandate for renewable energy, a 20 percent energy efficiency goal and a steadily decreasing cap on large emission sources (primarily from energy and industry) under the EU Emissions Trading System. This package of measures, combined with an overall goal of cutting emissions by 80-95 percent by 2050, was offered at the United Nations Climate Change Conference in Copenhagen in 2009 as Europe's contribution to tackling climate change.

The EU has now started preliminary discussions about a plan to cut emissions by 40 percent or more by 2030. However, these discussions take place against the challenge of stark regional disparities. Some EU countries, such as Austria, Denmark, and Luxembourg, consistently rank

among the 10 countries with highest gross domestic product (GDP) per capita globally, at more than USD 40,000. Other EU countries, such as Bulgaria and Romania, have GDP per capita consistently below USD 20,000, according to statistics by IMF and World Bank). The potential for both energy efficiency and renewable energy also varies markedly between regions.

The EU has relatively low domestic fossil energy resources. The region is 85 percent dependent on imported oil, 67 percent dependent on imported gas, and 62 percent dependent on imported coal (Source: Eurostat 2013). Europe's dependence on energy imports from overseas is expected to increase significantly over the coming years (IEA, 2013). The bloc also faces a challenge to its competitiveness as a result of high energy prices, which have risen markedly in recent years at the same time that energy prices have fallen significantly in the United States.

All of the 28 EU governments were democratically elected, meaning that any significant departure from 'business as usual' requires public debate and carries electoral risks for politicians. Markets are generally liberalized, meaning that new energy investments are ultimately expected to compete on an equal footing with incumbent energy investments.

Approach

The aim of the EU's "Roadmap for moving to a competitive low carbon economy in 2050" (2050 Roadmap) is to demonstrate that cutting EU greenhouse gas (GHG) emissions by 80 percent by 2050 is not only technically feasible, but can also be achieved without significant negative impacts on the European economy in the long term. It sets out milestones along a cost-effective pathway to this goal – reductions of around 40 percent by 2030 and 60 percent by 2040.

The 2050 Roadmap foresees electricity playing a central role in the future low-carbon economy. The analysis shows that the power sector can almost totally eliminate carbon dioxide emissions by 2050, and that electrification of the buildings and transport sectors will ultimately lead to deep reductions in carbon emissions from all three areas.

A range of illustrative decarbonization pathways was developed to explore the range of possible options for reaching the GHG reduction goals. The total annualized increase in capital expenditure was calculated and compared with the annualized spending on energy for each of the pathways. Several scenarios were used for international fossil fuel prices, reflecting the reduction in fossil fuel prices that would be likely to occur if other economies were to reduce their fossil fuel consumption at a comparable rate, or if they failed to keep track with the EU. The operating expenses (OPEX) and capital expenditures (CAPEX) in each of the scenarios were compared with the baseline using the PRIMES partial equilibrium model. The macroeconomic impact was calculated using the GEM E3 general equilibrium model of the European Commission's Joint Research Centre.

Communication of the 2050 Roadmap focused on the co-benefits of the shift to a low-carbon economy, such as avoided spending on fossil fuels; competitiveness in areas of low-carbon technology; job creation in these industry sectors; avoided damage to health due to air pollution; and improvements to international relations in climate negotiations. It targeted a range of audiences from policymakers to investors to EU citizens.

A key element of the 2050 Roadmap process initiated by the European Commission was to set a policy agenda on climate, energy, and transport for the EU trade block. Using an iterative process involving a wide range of stakeholders to develop a robust analysis of a low-carbon economy by 2050, the European Commission managed to depoliticize the climate and energy agenda to some extent. This approach has progressed the debate from the question of "why are we decarbonizing?" to "how can we decarbonize in an optimal way?". This is one of the key success stories of the 2050 Roadmap.

Outcomes

The 2050 Roadmap was published on 15 December 2011, in the form of a communication addressed to the Council, the European Parliament, the European Economic and Social Committee, and the Committee of the Regions, as well as to national parliaments for their information.

The 2050 Roadmap not only examined the "how" of achieving an 80 percent economy-wide decarbonization by 2050, but also looked at the synergies, risks, and trade-offs that might be achieved in the process.

Synergies were categorized as follows:

- **Reduced import dependency** – Averaged across the 40 years to 2050, the Commission estimated that the combination of improved efficiency and the shift to domestically produced renewable energy would reduce the EU's average fuel costs by between EUR 175 billion and EUR 320 billion per year. This would not only reduce fuel costs but also serve to improve energy security and reduce the import dependency of the bloc;
- **Increased innovation and job creation** – Although there was no detailed economy-wide estimate of net employment impact in 2050, the Commission cited data showing strong historical job growth in the EU renewables sector, and highlighted the potential for future growth in both this sector and the construction sector. However, net job creation is the variable of interest, and therefore upswings in employment in one sector must be analyzed in the context of job losses in other displaced industries and sectors;
- **Improvements to air quality** – The Commission estimated that the annual cost of controlling air pollutants could be reduced by EUR 50 billion by 2050. These developments would also reduce mortality, with benefits estimated up to EUR 38 billion by 2050.

Risks and trade-offs were categorized as follows:

- **Risks to competitiveness** – One of the risks highlighted was that increased costs of carbon reduction could force EU companies to relocate to overseas jurisdictions with weaker carbon controls. This risk would be reduced if other world regions cut carbon emissions at a comparable rate. The risk was highest for energy-intensive industries, but also existed for the agricultural sector;
- **Investment risks** – The transition to a low-carbon economy requires large upfront capital investments, and a risk was identified that consumers and the private sector would be unwilling to make these investments.

The breadth of this analysis is seen to represent good practice in that it includes many of the synergies that can be captured during the transition to a low-carbon economy, but neither does it ignore the challenges, risks, and trade-offs. Some of the synergies, however, can be

difficult to quantify, such as the cross-sectoral opportunities that might arise from innovation, or the increased demand for products that might arise in one sector (e.g. lightweight plastics) from GHG reductions in other economic sectors (e.g. transport). Other limitations of the 2050 Roadmap were the lack of detailed analysis of national or regional impacts. Furthermore, it is difficult for economic models to capture impacts on competitiveness. These limitations go some way to explaining why the 2050 Roadmap has met resistance from both energy-intensive sectors and high-carbon economies such as Poland.

The impact on employment and economic output was communicated in detail to the target audience concerned with economic affairs. Particular attention was given to industries that might feel the pressure to relocate overseas to avoid the cost of compliance. Separate messaging was developed that addressed EU citizens and especially their concerns that the transition to a low-carbon economy would increase the cost of energy. All media were engaged – print media, radio, television, and the online community.

Good practice was evident in that the messaging was holistic in its approach, addressing all key audiences with messages on a wide range of synergies and trade-offs. This was to some extent a function of the Commission's holistic approach to analysis, but also its stakeholder-led approach to policymaking: A six-week online stakeholder consultation was conducted in 2010, which received 281 responses, of which 156 were from organizations and the rest from individual EU citizens.

The limitation of the 2050 Roadmap was its complexity, with insufficient effort made to simplify and communicate the key messages.

Lessons

Efficiency

Such in-depth analysis requires input from a wide range of technical and economic experts, and might exceed the resources of smaller governments.

The Commission's rigid focus on reducing emissions in the power sector, combined with electrification of buildings and transport, might be insufficiently flexible to accommodate rural economies and high-carbon economies, which might have cheaper abatement options in other sectors such as agriculture. This might partially explain why Poland continues to block the adoption of the 2050 Roadmap as EU policy.

Robustness

The 2050 Roadmap combines economic impact analysis with long-term policy objectives. It examines many of the synergies of transition to a low-carbon economy, but also addresses the challenges, trade-offs, and risks. It also effectively engaged a wide audience. Calculating societal impacts as far as 2050 is by definition uncertain and sometimes seen to lack credibility. The robustness of the modeling behind the 2050 Roadmap is difficult to ascertain because of a lack of transparency. The Commission has been criticized in the past for not providing sufficient visibility of inputs and assumptions for the energy modeling in PRIMES. Concerns have also been raised about the appropriateness of using combined general equilibrium models for modeling energy systems. Such models assume that markets function efficiently and ultimately reach economic equilibrium, whereas empirical evidence suggests that there is wide variance in the degree to which different markets transmit energy price signals.

Impact

The influence of such road-mapping exercises is difficult to establish. However, by demonstrating that such deep levels of decarbonization are feasible, the European Commission might have contributed to the national energy debates that are currently under way in Germany, France and the United Kingdom.

Further Information

EU Low Carbon Roadmap: http://ec.europa.eu/clima/policies/strategies/2050_en

GGBP sponsors:

Global Green Growth Institute | European Climate Foundation | CDKN Climate & Development Knowledge Network | Ministry of Foreign Affairs of the Netherlands | UKaid from the British people